Ministry of Agriculture

Agriculture, Food Security and Climate change: Background paper for BDF 2015

1. Achievements in agriculture and food security

Agriculture is the main activity and lifeline of Bangladesh economy. The role is important in improving the wellbeing of the vast population through enhancing productivity, profitability and employment generation in the rural areas. Agriculture sector (crops, livestock, fisheries and forestry) makes an important contribution to GDP of the country, provides employment of about half of the labor force, and remains a major supplier of raw materials for agro-based industries. Agriculture is a special field of social activities that are directly involved in food and nutritional security, income generating opportunities and poverty reduction. Hence, improvement of agriculture sector and acceleration of its growth is essential for ensuring food security and to reduce the rural poverty. In this regard Bangladesh achievements especially in reducing food insecurity are well known internationally, and celebrated. The country achieved MDG1 – halving hunger by 2015 - with time to spare. There has been significant progress by all three measures of food insecurity – food availability, food access and food utilization.

As regards availability, a tripling of food grain production since the country's Independence in 1971 represents significant progress, and today Bangladesh can boost a modest rice export. Food access is seen in the improvement to the under-nutrition figure, which fell to around 16% of the population, while the latest child under five stunting figures (2014) – a measure of chronic undernourishment – is 36.8% of the population, also well down on 1990-92 figures. The country was one of the first to develop a Country Investment Plan for Food Security (2010), which has served as a useful tool for monitoring progress and for assuring the coherence of efforts in the food security area. It is used by both government and by development partners.

More food is **available** due to a Bangladeshi Green Revolution in the forty years since Independence. The adoption of high yielding varieties, greater use of mineral fertilizer and both deep and shallow tube-well irrigation have pushed up rice yields dramatically – the overall increase is due to intensification rather than more land being used for cropping. Research and adoption of Hybrid crops varieties are also contributing in more crop production. In addition, there has been a large scale adoption of mechanization (small 3-wheel tractors/power tillers). This has helped increase efficiency of harvest and

land preparation operations, pushing average cropping intensity up to 190% (almost all farmers are double cropping, and some are achieving three or four crops in a year). What was previously the main rainfed crop (rice planted in July/August), has been replaced by the winter *boro* crop which now accounts for over 60% of production, and is more predictable as it relies on irrigation.

While the highlights are in rice production, more modest increase are seen across the board - in other field crops, fruits, vegetables, potatoes, fisheries and livestock. Crops such as maize - which was previously rarely grown in Bangladesh - have become significant in certain parts of the country; it requires less water (and is more drought tolerant) than rice, while demand for maize continues to increase related to the growth of the poultry sector. Technologies have supported the increased fruit production and produce vegetables round the year which were previously unknown. Bangladesh is now exporting vegetables in ethnic markets in different parts of the world. Now government wants to adopt seaweed. Seaweed is a marine algae and is classified as a plant. It is a versatile plant used as food for human consumption. Seaweeds are used for different purposes such as fodder, fertilizer, industrial and pharmaceutical raw materials, etc. Seaweed has great value in providing low-cost, wholesome nutrition and therapeutic protection. Bangladesh is rich with 133 species of seaweed and eight of them are commercially important. These could be produced commercially large scale. Coastal area with sandy and muddy beaches, estuaries and mangrove swamps provides substrate and habitats for various seaweeds cultivation. Aquaculture has experienced its own revolution, over the past 15 years, with shrimp and at the same time, both dairy and poultry sectors have also experienced growth. The total fish production in FY 2007-08 was 25.63 lakh MT, which increased to 35.55 lakh MT in FY 2013-14 (Economic Review 2014).

Access to food is principally concerned with food being obtainable in the market, and is largely determined by levels of income. Poverty reduction efforts, general economic development and programmes to introduce social safety nets have all contributed to improved access to food in Bangladesh over the past 15 years. Efforts are underway to extend and standardize the social protection system, with the National Social Security Strategy linked to the new 7th Five Year Plan, to make sure that no one is “left behind”.

In terms of **utilization**, improved supply of all food types – along with education programmes to promote better nutrition - has contributed to an increase in dietary diversity, to the point that rice now makes up a diminishing proportion of the diet, particularly for urban consumers (down from over 70% of consumption to around 60% - and nearer to the WHO recommended figure of 55%). Multidisciplinary programmes

combining food and health based programming are beginning to show results, including practical elements such as improved food preparation practices to make maximum use of available nutrients.

The picture of improved supply, access and use is undoubtedly a positive one, but that is not so say that all food security issues have been solved in Bangladesh. An estimated 16% of the population is thought to be to some extent food insecure (based on calculation of overall food supply) - despite evident reduction in poverty over recent decades – and this represents over 25 million people; and the rate of reduction of this figure seems to have stalled. Certain parts of the country are worse affected than others (notably the North East, areas which are subject to seasonal flooding, and parts of the Chittagong Hill Tracts) , and within those, pockets of food insecurity exist driven by particular local factors (lack of paid work at certain times of the year, health status, age, disability, disadvantage of certain ethnic groups, dependency on scarce or degraded natural resources, or landlessness can all contribute).

Although record production figures have been achieved in recent years, land is being converted to non agricultural use, or lost due to degradation or erosion, at a rate of around 0.4 % per annum. Population continues to rise, although the rate of growth has slowed somewhat. Urbanization – and rural-to-urban migration – is likely to continue, and may lead to localized labor shortages at key points in the agricultural calendar (such as harvesting, land preparation or transplanting). Evidence suggests that rural daily wage rates are on the increase.

In terms of utilization, while stunting figures have improved, and notably at a faster rate than neighboring countries in South Asia, large numbers of people are still affected. There is a growing recognition that a range of factors which need to be addressed to tackle stunting, including a sufficient and diverse diet, micronutrient supplementation, hygiene and sanitation, education and so on.

2. Climate change

Bangladesh, being a low-lying deltaic country on the Bay of Bengal, is widely cited as being one of the countries most at risk from the effects of climate change.

Climate change models for Bangladesh suggest the effects are likely to be quite complex, and so will require a number of different strategic efforts to address them. For instance, there is an increased probability of more extreme weather events over a 30 year time horizon, though models do not give a clear prediction regarding frequency or intensity. Rainfall patterns are likely to be disrupted, and become more variable, but annual rainfall

levels are likely to remain more or less constant overall. Temperature rises are predicted (~1.2 deg C by 2050); sea level rise is another threat (~27cm by 2050).

Each of these phenomena has the potential to have a significant impact on food security.

- **Variable rainfall:** anecdotally, weather patterns are changing – rain occurs at times when it was previously unexpected, or rains are delayed in their onset. Clearly this has the potential to create significant problems in cropping systems, and other activities which depend on crops as a feedstock, creating problems of food supply. In coastal zones, water levels are close to the surface – and in some parts water logging is a problem. Salinity may be partly due to rising sea levels, but another (major) contributing factor is the reduced flow in the river system in Bangladesh caused by upstream water use patterns in India.
- **Temperature rises:** rising temperatures have an impact on the range of crops which can be grown at different locations – many varieties of wheat, for instance, require cool night time temperatures if yield is to be maximized. At the same time other production systems are favoured by higher temperatures. Aquaculture systems may become more productive under increased temperature conditions – at the same time, pond biochemistry may also be changed, affecting supplies of feed and oxygen, with an impact on the productivity of the system.
- **Extreme weather events:** Coastal Bangladesh has been badly affected over the years by cyclonic storms originating in the Bay of Bengal. Most recent events were tropical storm *Mahasen* from May 2013 and a slow moving storm with exceptionally heavy rainfall in SE Bangladesh during July 2015 resulting in major landslips and flash flood damage. *Mahasen* in particular came at a time when the boro rice crop was only partly harvested and a large number of individual farmers suffered significant losses.
- **Sea level rise:** projections suggest sea level rises would compound the slow settling of land in the coastal zone of the delta. Major investments to enhance coastal defenses are already being planned. Originally, empoldering was done to reclaim land for cultivation. However, recent water-logging combined with lack of operation and maintenance of embankments, sluice gates, etc, has supported the emergence of aquaculture, and particularly shrimp farming, as an economically lucrative alternative. Each of these effects can clearly be seen to affect food availability.

But climate change also has the potential to affect the opportunities for paid work – the disruption of storms (such as the major cyclones *Sidr* and *Aila*) to the rural economy can be felt for up to 5-10 years after the event. This has a bearing on access to food.

Climate change may also have an impact on nutrition. Some crops grown under stressed conditions may not contain the expected level of nutrients or micronutrients. Rising temperature may increase prevalence of certain pathogens, and also reduce the ability to store certain foods for any length of time. Extremes of climate may also create stresses on the human population affected, which may hamper their ability to absorb the nutrients contained within their daily diet.

3. Addressing the problems of food insecurity and climate change

The Government of Bangladesh has adopted a Master Plan for Agricultural Development of the Southern Region of Bangladesh. Although it is clear that climate change can have a negative impact on food security, adaptation strategies can be identified which will help farmers and other food producers cope better with climate change. Some of the main activities which are already in hand include the following:

- Development and deployment of stress-tolerant varieties of crops – the range of stresses may include high levels of salinity, drought, and long term inundation. In addition short duration varieties can be produced which escape the worst of the increase in seasonal salinity in the coastal zone, or can be harvested before the main cyclone seasons.
- In areas suffering drought, or variable rainfall, planting of less water-loving crops may be an option to cope with variable rainfall, as may identifying alternative sources of irrigation water. The government has laid special emphasis on the increased use of surface water and reduced use of ground water in irrigation to protect the ecological balance and reduce irrigation expenses. As part of the strategy creation of water reservoir/ rain water harvesting in rain fed/ coastal/ hilly areas will be encouraged, and small scale water resources systems will be developed (particularly through BADC/LGED/BWDB) along with monitoring the maintenance of the small scale water resources infrastructure at local levels by ensuring community participation and taking care of environmental and social issue.
- Diversification is another strategy to minimize risk from climate change, and reduction of potential crop losses. Integrated production systems, including homestead production, may help protect those with limited landholdings against the effects described above.

- Agronomic innovations may also provide a means to adapt to climate change. Greater control of water resources to permit techniques such as Alternate Wetting and Drying, if applied on a large scale, could conserve irrigation water; mulching and soil fertility conservation measures could also help cope in areas prone to drought

In all of these areas which focus on productivity improvement and food supply, the partnership between farmers, extension workers and researchers is key.

4. Planning programmes and sources of funding (present and future)

The key sources of funding for climate adaptation programmes which address food security issues are as follows:

- Government of Bangladesh resources through the Annual Development Plan (including through the Bangladesh Climate Change Trust Fund)
- Bilateral assistance from development partners, including International Finance Institutions
- Global adaptation funds such as the Green Climate Fund

The overall context is set by the Bangladesh Climate Change Strategy and Action Plan developed in 2009, with further direction to be provided by the Country Investment Plan for the Environment Forestry and Climate Change which is currently under preparation by the Ministry of Environment and Forestry.

5. An agenda for future work for development of Bangladesh

The 7th Five Year Plan sets out clear strategies for agriculture based on

- Programmes for Integrate Climate Change and Food Security
- Investment in Research and Development.
- Human Resources Development
- Technical assistant for design, support efforts for Monitoring Implementation and scale up
- Mechanization in agriculture and Promoting Science-led Agriculture Technology System.
- Investment in post harvest technology
- Investment in Value chain.
- Investment in ICT agriculture
- Technology transfer for seaweeds and aquatic resources

- Economic Use of Water resources.
- Invest in coastal aquaculture and marine fisheries
- Capacity development of the research institutions
- Investment in dairy and cattle development
- Private sectors encourage establishing small scale rural agro processing center.

The implication is the development of integrated programmes to address both food security and climate change considerations, while putting emphasis on nutrition, and production of high value crops.